Vacucenter VC20 / VC50

User Manual

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User Manual Vacucenter VC20, VC50

CE DECLARATON OF CONFIRMITY 4

IMPORTANT INFORMATION 5

Quick Information for Service 5

TECHNICAL DATA'S 6

INTRODUCTION 7

Overview 7
Applications 7
Construction 7
Vacuum and Air Systems 7
Controller 8
Safety 8

GETTING STARTED 9

Parts delivered 9
Install requirements 9
Installing 9
Cleaning 9

SYSTEM COMPONENTS 10

CONTROLLER 11

Keypad & Display 11

OPERATING 12

How to interpret displays described in this manual 12
Main Menu - Overview 13
1 Main Menu - Temp & Options 14
2 Main Menu - Program 16
2.1 Menu Program - Start 17
2.2 Menu Program - New 18
2.3 Menu Program- Edit 20
2.4 Menu Program - Delete 23
2.5 Menu Program - Print 23
3 Main Menu - Configuration 24
4 Menu Service Mode 26

STATUS DISPLAYS 27

General 27
5 Status Display: Manual Mode – Defined Start-Date 27
6 Status Display: Manual Mode – Process Running 27
7 Status Display: Program mode - Defined Program Start Date 28
8 Status Display: Program mode - Program Running 28
9 Cancel a running process by ESC Key 30
10 Messages and Errors 30

PRINTER OPERATION 31

Connecting a Printer 31
Examples of different printer outputs 31

APPENDIX A 32

Hysteresis Value for the Vacuum-Control 32
Graphs of temperature limits and gradient and Program-Run 32

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RANGE OF GRADIENT 32
GRAPHICAL PRESENTATION OF A PROGRAM-RUN 33
APPENDIX B 34
MENU STRUCTURE & INPUT FIELDS 34
APPENDIX C 35
WIRING DIAGRAM VC 20 35
APPENDIX D 37
WIRING DIAGRAM VC 50 37
APPENDIX E 39
DRAWING VC 20 39
APPENDIX F 40
DRAWING VC 50 40
APPENDIX G 41
DRAWING SPARE PARTS PANEL 41
APPENDIX H 43
DRAWING SPARE PARTS DOOR 43
APPENDIX I 44
DRAWING SPARE PARTS CHAMBER 44
APPENDIX J 45
DRAWING SPARE PARTS VALVE / POWER SUPPLY 45
APPENDIX K 46
SPARE PART NUMBERS 46
SPARE PART NUMBERS 47

CE DECLARATON OF CONFORMITY

CE

Declaration of Conformity

Wir
We **Renggli AG / SalvisLab**
Nous

(Name des Anbieters) (supplier's name) (nom du fournisseur)

Birkenstrasse 31, CH-6343 Rotkreuz

(Anschrift) (address) (adresse)

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product
déclarons sous notre seule responsabilité que le produit

Vacuum Drying Oven **VC – 20 / 50**

Year of Construction **2002**

(Bezeichnung Typ oder Modell, Los-, Chargen- oder Seriennummer, möglichst Herkunft und Stückzahl)
(name, type or model, lot, batch or serial number, possibly sources and numbers of items)
(nom, type ou modèle, no de lot, d'échantillon ou de série, éventuellement sources et nombre d'exemplaires)

auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder normativen Dokument(en) übereinstimmt
to which this declaration relates is in conformity with the following standard(s) or other normative document(s)
auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou autre(s) document(s) normatif(s)

(Titel und/oder Nummer sowie Ausgabedatum der Norm(en) oder der anderen normativen (Dokumente)
(title and/or number and date of issue of the standard(s) or other normative document(s)
(titre et/ou no et date de publication de la (des) norme(s) ou autre(s) document(s) normatif(s)

Gemäss den Bestimmungen der Richtlinie(n): following the provisions of Directive(s); conformément aux dispositions de(s) Directive(s)
(falls zutreffend) (if applicable) (le cas échéant)

73/23/EWG **89/336/EWG**
EN 60335-1 1988 **EN 55014**

(Ort und Datum der Ausstellung)
(Place and date of issue)
(Lieu et date)

(Name/Unterschrift oder Kennzeichnung des Befugten)
(name and signature or equivalent marking of authorised person)
(nom et signature du signataire autorisé)

Rotkreuz, 12.02.2002

Marcel Käppeli
Technical Manager

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Important Information

Quick Information for Service

Please fill out all necessary information for your Vacucenter.

SERIAL NUMBER:	
TYPE	☐ VC20 ☐ VC50
VACUUM OPTION	☐ None ☐ Vacuum Display ☐ Vacuum Control Valve ☐ Vacuum Control Pump
PHONE NUMBER SERVICE	
PURCHASE DATE	
SOFTWARE VERSION (See Display on Power ON)	

Technical Data's

			VC 20	VC 50
Outer Dimension				
Width		mm	545	645
Height		mm	375	475
Depth		mm	425	525
Installation: Wall distance from the back		mm	50	50
Installation: Wail distance from the side		mm	50	50
Inner Dimension				
Width		mm	250	350
Height		mm	250	350
Depth		mm	320	420
Internal volume		l	20	50
Shelf		standard/max	1/3	1/5
Shelf dimension		mm	300x240	400x341
Distance between shelf (WxD)		mm	57	54
Max. load per shelf		kg	20	20
Max. load per oven		kg	37	47
Weight of oven (empty)		kg	48	62
Temperature range approx. 5 °C over RT to		°C	200	200
Temperature deviation [1]	at 50°C	± °C	1.0	1.0
Temperature deviation [1]	at 100°C	± °C	1.7	1.9
Temperature deviation [1]	at 150°C	± °C	2.4	2.6
Temperature fluctuation [2]	at 150°C	± °C	0.2	0.2
Heating up [3]	to 70°C	Min	39	42
	to 150°C	Min	58	106
Vacuum connection		mm	NW 6	NW 6
Pass through		mm	NW 25	NW 25
Vacuum (absolute)		mbar	$< 4.8 \times 10^{-1}$	$< 6 \times 10^{-1}$
Vacuum leakage rate		Liter/Second	$< 1.7 \times 10^{-3}$	$< 4.2 \times 10^{-2}$
Power supply (±10%) 50/60 Hz		V	230/115	230/115
Nominal wattage		W	900	1200
Energy consumption	at 100°C	W	185	205
	at 150°C	W	243	286
Recommended ambient values		°C	15 – 25	15 – 25
		RhF%	20 – 60	20 – 60
Equipment				
Microprocessor -Temperature Controller with LCD			Yes	Yes
Timer		Hours / Min	0-999h 59m	0-999h 59m
RS232 Interface			Yes	Yes
Adjustable Print Interval			Yes	Yes
Programming		Program / Step	50 / 15	50 / 15
Ramp function			Yes	Yes

1) Measured with 3 temperature probes on horizontal level / divided in 1/3 of the chamber size
2) maximum temperature deviation in time for one temperature probe
3) to 98% of set temperature

All technical specification are specified for units with standard equipment at an ambient temperature of 25 °C (77 °F) and a voltage fluctuation of ±10 %. The temperature data are determinated in accordance to following DIN 12880, part 2 respecting the recommended wall clearances of 10 % of the height, width and depth of the inner chamber (vacuum set to 10.0 mbar). All indications are average values, typical for units produced in series. Differing ambient temperatures or variances in the design of individual equipment may produce different performance. We reserve the right to alter technical specifications at all times without prior notice.

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Introduction

Overview

The Vacucenter VC20 / VC50 is a vacuum oven with a Microprocessor Controller with enhanced Fuzzy Logic - Allows precise ramping of temperature as well as an excellent reproduction of temperature distribution in the chamber.
Special Insulation - Less heat loss. Saves energy and costs. Ambient temperature of housing surface
Robust Swiss quality design – Made even for scientific applications
Work Chamber are of stainless steel and provided with aluminium shelve
The chamber has well radiused corners for easy cleaning.
Exterior is of textured powder coated mild steel.

Applications

The Vacucenter Line is designed for all purposes of vacuum drying in a variety of laboratory fields. All Systems have a controller with alphanumeric display and programming capabilities. Temperature ranges up to 200°C.

Note: The Vacucenter ovens are not built to use as ovens for drying substances which are explosive or let free explosive gases during the drying process.

Construction

Extremely compact construction. Saves valuable space in the lab.
Inner chamber of electro-polished stainless steel. Resistant to chemicals and highly durable.
Much more shelf area than other vacuum ovens (for the same inner volume): max. 5 shelves in the VC 50, max. 3 shelves in the VC 20.
Shelves made of 5 mm thick aluminium conduct heat efficiently.
Aluminium shelves are anodised to resist chemicals.
Door seal can easily be removed for cleaning or replacing. The door seal of other vacuum ovens is either glued-in place or screwed-in.
All corners are rounded.
The big size glass-window allows a full view of the inner chamber.
The window is made of double glazed safety glass. This is a safety feature: should one pane break, there is still a second one. Tile double-glazing is also an excellent thermal insulator.
All corners are rounded. The door handle is integrated in the door. No hot surfaces. There is no risk of injury or burn.
The door latch is spring loaded. Should there be an over-pressure caused by accidental oxidation inside the chamber, the door will open slightly and allow its release.

Vacuum and Air Systems

Electromagnetic valve controls the vacuum connection at rear. In ease of power failure, this valves shuts automatically, the oven is tight and thus remains under vacuum. When the power comes back, the vacuum valve opens automatically and normal operation resumes. The timer continues where it left off.
The inlet of fresh air or inert gas is controlled by a needle valve which allows gentle metering of the incoming air (or gas) and thus prevents turbulence inside the chamber.
A deflector plate at the inlet of the chamber prevents the incoming air from blowing down directly at a powder sample.

Controller

Fuzzy-Logic microprocessor controller with digital alphanumeric LCD-Display and real time clock.
Wide range of temperature ramping functions. More user application. In combination with Fuzzy-logic gives you an excellent stability of temperature distribution and accuracy of programmed values.
Brilliant LCD Display for user-dialog and easy to operate keypad for fast programming and operating.
User dialog with controller is displaying your local language. Up to five languages can be selected.
Easy to operate and programming with EasyMenu
It allows the storage of 50 programs and 15 program steps (step = 1 ramp, 1 temperature and a dwell time = Hold Time). The programs remain stored in memory even without external power (battery buffered).
Holding Time (dwell time) 0 - 999h 59m
The real time clock allows a process to be started at any time – i.e.: on January 6, 2002 at 5 30 in the morning.
RS232 interface. All data can be protocol with a printer or computer.
Door-Switch interrupts heater by opening door

Safety

DIN 12880 class 3.1 In case of over-temperature, a built in safety controller as a back-up circuit takes over the control of the heating and will shutdown the oven.
There is also an additional mechanical over-temperature device which shuts down the oven
High quality accurate PT 100 temperature sensors.
Superior “Swiss Made” manufacturing quality according ISO9001

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Getting Started

Parts delivered

Your System will be delivered with following Parts:
1 System Unit
1 Shelf
1 Power Cord
1 User Manual

Install requirements

Ensure that following conditions are met before you install the system.
Electric power connection as per type plate on inside of door must meet your power connector.

Installing

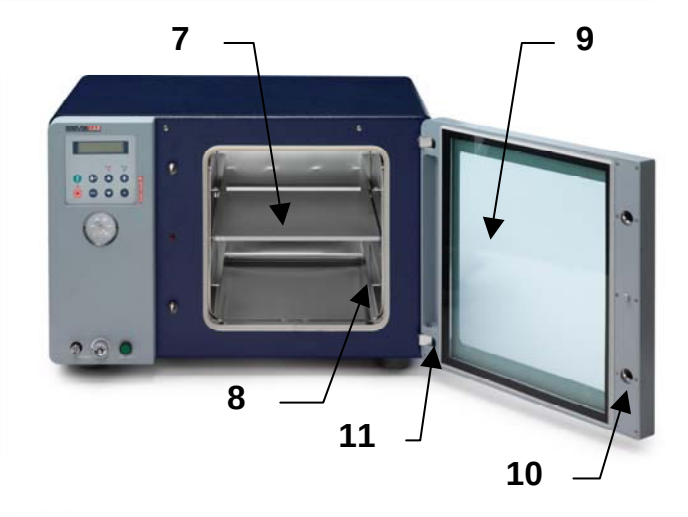
Place shelf in appropriate position
Plug cord
Close door
Switch power on
Display shows current Firmware Version during Power On Sequence
To start oven or program it see Chapter Operating Menus

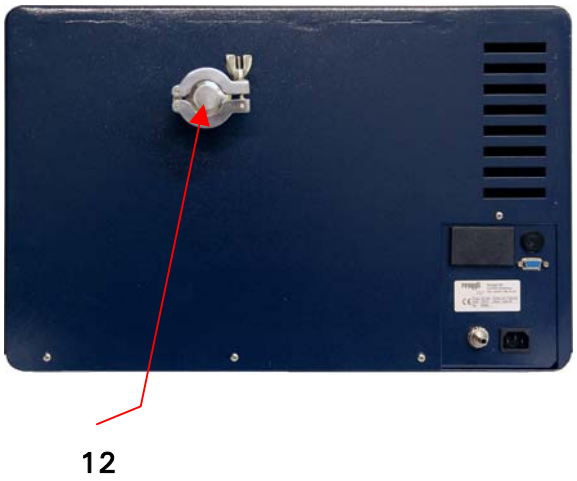
Cleaning

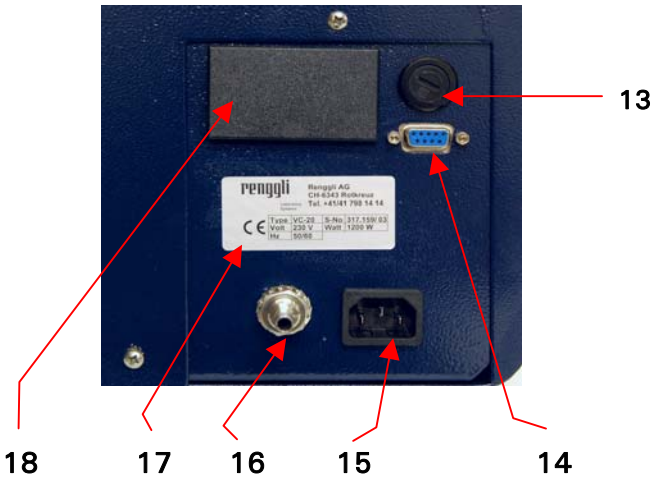
To clean the System use mild detergents. No Acid or similar detergents should be used.

System Components

1 Controller
2 Pressure Gauge
3 Inert Gas / Air Inlet
4 Precision Valve
5 Vacuum Switch
6 Door Handle
7 Shelf
8 Shelf Glider
9 Double Paned Security Glass
10 Spring loaded door lock
11 Spring loaded door hinge
12 Pass through NW 25
13 Main Fuse
14 Serial Interface RS232
15 Power connection
16 Vacuum connection
17 Serial number plate
18 Power connection for vauum pump (only by option vacuum control of internal valve and vacuum pump)







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Controller

To control the system the controller has few “easy to use” buttons on a foil keypad. Simply press desired button.
All information is displayed on a Liquid Crystal Display (LCD) with backlit.
LED Indicators for status of Power, Heating and Program are used to indicate the main process status.

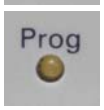
Buzzer (not visible) is indicating audible Status or Alarm

Keypad & Display

Buttons

	▲	Up	You can scroll through the menu structure
	▼	Down	You can scroll through the menu structure
	↵	Enter	Confirm a menu selection, Confirm a value input or an answer choice
	ESC	Escape	Cancel actual operation, Go back in Menu Structure, Quit actual state ….
	+	Plus	Increase a value in flashing input fields , Select multiple Choices; Input Value must flash to make + button operable
	-	Minus	Decrease a flashing value, Select multiple Choices; Input Value must flash to make + button operable
		ON/OFF	Switch ON or OFF your System. When on LED is lit

LED Indicators

	When **lit**: Heat Power is on
	When **lit**: You are running a program When **flashing**: A delayed start for program operation was entered.

How to interpret displays described in this manual...

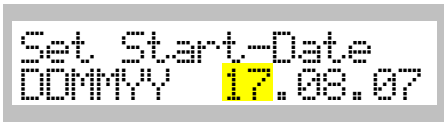
Power ON Sequence

By pressing the power on button, the display will show the software version. All pre-setted or saved information are loaded during this process. After a while display will show first Main Menu Point

Input Field

A input value which is highlighted with yellow (grey) background means this value is flashing on the real display.

Multiple Input Fields



If you reach a multiple input display first time, the first part (... of 3 in this example) of the input field is flashing to indicate input here.. Flashing input fields are changed with +/- keys

Multiple Choice Fields

In a multiple choice field the last actual saved value is flashing. Change with + or – and confirm with ↵

Definitions of terms

What is a Set Temperature?

A Set Temperature is the target temperature you want operate the oven with.

What is a Gradient?

A Gradient is the slope of the heating up process to the specific set temperature.
It is indicated as °C/Minute. Negative Gradients are not allowed. The maximal value of a gradient is system depending and has a range and is pre-defined by factory

What is a Set Vacuum / Hysteresis Vacuum (only with Vacuum Controller Option)?

Set Vacuum is the target vacuum value. Hysteresis Vacuum is the vacuum value range to the set value. Within this range the valve or pump is not active. This is a P-control behaviour.

What is a Holding Time?

A timer is used to specify how long a set temperature has to be hold. The timer starts counting back when the set temperature is reached. The maximal time you can set is: 999 hours and 59 minutes. This equals a max time of 41 days 15 hours and 59 minutes

What is a Start Date/Time

If you are using a start date or time you will be able to set a future date/time to start a process or a program.

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Main Menu - Overview

General operation buttons

In general you can scroll through the menu points with the ▼ or ▲ button.
Select the desired menu point with ↵

1 Temperature & Options

Manual Operation: Define a set temperature and options like gradient, Vacuum values, Hold-time (dwell-time), programmed start date/time.
↵ Accept Menu ➔ **1.1**
ESC returns to ➔ **1**

2 Program

Programmed Operation: The menu Program is divided in menus for creating, editing, deleting , starting and printing programs.
↵ Accept Menu ➔ **2.1**
ESC returns to ➔ **1**

3 Configuration

This menu point allows you to configure the system
↵ Accept Menu ➔ **3.1**
ESC returns to ➔ **1**

4 Service Mode

This menu point is protected by an access code and is available only for trained Service Technicians.
↵ Accept Menu ➔ **4.1**
ESC returns to ➔ **1**

1 Main Menu - Temp & Options

Manual Operation: Define a set temperature and options like gradient, Vacuum values, Hold-time (dwell-time), programmed start date/time
↵ Select Menu ➔ **1.1**
ESC returns to ➔ **1**

1.1 Set Temperature

+/- Change value
↵ Accept value ➔ **1.2**
ESC restores the old value or returns to ➔ **1**

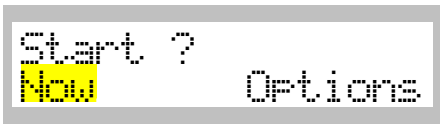
1.2 Set Vacuum

Appears only with Option Vacuum Control !
+/- Change value
↵ Accept value ➔ **1.3**
ESC restores the old value or returns to ➔ **1**

1.3 Set Hysteresis of vacuum (P-type control behaviour)

Appears only with Option Vacuum Control !
+/- Change value
↵ Accept value ➔ **1.4**
ESC restores the old value or returns to **1**

1.4 Select Quick Start or Start with Options



+/- Change answer
↵ Accept answer
If **Now** selected: System will start immediately ➔ **6**
If **Option** selected ➔ **1.5**
ESC cancels and returns to ➔ **1**

1.5 Set Gradient

+/- Change value
↵ Accept value ➔ **1.6**
ESC restores the old value or returns to ➔ **1**
Note: A value of **0,0** means maximal possible gradient value!

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1.6 Set Holding Time (dwell time)

+/- Change value
↵ Accept value and skips to the next input field (HH ➔ MM) or stores the time and go to ➔ **1.7**
ESC restores the old value and skips back one input field (MM➔HH) or goes back to ➔ **1**
Note: A value of 0:00 means endless holding time

1.7 Set Start-Date

+/- Change value
↵ Accept value and skips to the next input field (DD ➔ MM, MM➔YY) or stores the date and go to ➔ **1.8**
ESC restores the old value and skips back one input field (YY➔MM, MM➔ DD) or goes back to ➔ **1**

1.8 Set Start Time

+/- Change value
↵ Accept value and skips to the next input field (HH ➔ MM) or stores the time and go to :
If the Start Date and/or Start Time is in the **past**, the display will return back to ➔ **1**
If your Start Date and/or Start Time is in the **future** you will see the operating display ➔ **5**
ESC restores the old value and skips back one input field (MM➔HH) or goes back to ➔ **2.1**

2 Main Menu - Program

Programmed Operation: The menu Program is divided in menus for creating, editing, deleting , starting and printing programs.
↵ Accept Menu ➔ **2.1**
ESC returns to ➔ **1**

2.1 Menu Program - Start

Start an existing program
↵ Accept Menu ➔ **2.1.1**
▼/▲ scroll through the Menu
ESC return to ➔ **2**

2.2 Menu Program - New

Create a new program
↵ Accept Menu ➔ **2.2.1**
▼/▲ scroll through the Menu
ESC return to ➔ **2**

2.3 Menu Program - Edit

Edit an existing program
↵ Accept Menu ➔ **2.3.1**
▼/▲ scroll through the Menu
ESC return to ➔ **2**

2.4 Menu Program - Delete

Delete an existing program
↵ Accept Menu ➔ **2.4.1**
▼/▲ scroll through the Menu
ESC return to ➔ **2**

2.5 Menu Program - Print

Print a program
↵ Accept Menu ➔ **2.5.1**
▼/▲ to scroll through the Menu
ESC return to ➔ **2**

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2.1 Menu Program - Start

Start an existing program
↵ Accept menu ➔ **2.1.1**
▼/▲ scroll through the sub menu
ESC returns to ➔ **2**

2.1.1 Select Program

+/- Change value
↵ Accept value ➔ **2.1.2**
ESC returns to ➔ **2.1**

Note: Only stored only program numbers with content will appear in the display. If no program exist a beep-message will displayed.

2.1.2 Choose type of program start

+/- Change answer
↵ Accept answer
If **Now** selected: System starts immediately ➔ **6**
If **Later** selected :➔ **2.1.3**
ESC returns to ➔ **2.1**

2.1.3 Set Start Date

+/- Change value
↵ Accept value and skips to the next input field (DD ➔ MM, MM➔YY) or stores the date and go to ➔ **2.1.4**
ESC restores the old value and skips back one input field (YY➔MM, MM➔ DD) or goes back to ➔ **2.1**
Note: The pre-set date is the actual date from the real-time clock.

2.1.4 Set Start Time

+/- Change value
↵ Accept value and skips to the next input field (HH ➔ MM) or stores the time and go to :
If the Start Date and/or Start Time is in the **past**, the display will return back to ➔ **2.1.2**
If your Start Date and/or Start Time is in the **future** you will see the operating display ➔ **7**
ESC restores the old value and skips back one input field (MM➔HH) or goes back to ➔ **2.1**
Note: The pre-set time is the actual time from the real-time clock.

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2.2 Menu Program - New

The storage capacity is 50 Programs with 15 Steps/Program. Each Step contains of a Set-Temperature, a Gradient, a Hold-Time and a Fan-Speed.
The sample here assumes creating a program #4 with 2 Steps.

Create a new program
↵ Accept Menu ➔ **2.2.1**
▼/▲ scroll through the Menu-Program.
ESC returns to ➔ **2**

2.2.1 Create a new program

+/- Change value
↵ Accept value ➔ **2.2.2**
ESC returns to ➔ **2.2**

Note: Only free program numbers will appear in the display.

2.2.2 Set Temperature – Step 1

+/- Change value
↵ Accept value ➔ **2.2.3**
ESC restores the old value or returns to ➔ **2.2** and the step 1 as well as selected program number is not stored !

Note: Display 04/01 means actual program/step number.

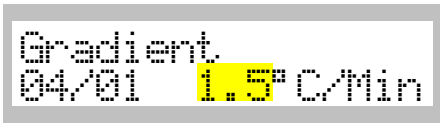
2.2.3 Set Vacuum – Step 1

Appears only with Option Vacuum Control !
+/- Change value
↵ Accept value ➔ **2.2.4**
ESC returns to ➔ **2.2**

2.2.4 Set Hysteresis of vacuum – Step 1

Appears only with Option Vacuum Control !
+/- Change value
↵ Accept value ➔ **2.2.5**
ESC returns to ➔ **2.2**

2.2.5 Set Gradient – Step 1



+/- Change value
↵ Accept the value ➔ **2.2.6**
ESC restores the old value or returns to ➔ **2.2** and the step 1 as well as selected program number is not stored !

Note: A value of 0:0 means maximal gradient

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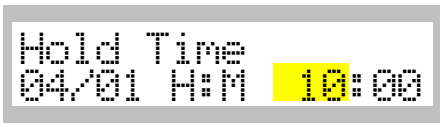
2.2.6 Set holding time (dwell time) – Step 1



+/- Change value
↵ Accept value and skips to the next input field (HH ➔ MM) or stores the time and go to ➔ **2.2.7**
ESC restores the old value and skips back one input field (M➔H) or goes back to ➔ **2.2** and the step 1 as well as selected program number is not stored !

Note: A value of 0:00 means endless holding time

2.2.7 Choose if a additional step is required

+/- Change answer
↵ Accept answer
If **Yes** selected: step number will increment with 1➔ **2.2.8**
If **No** selected: ➔ **2.2.14**

2.2.8 Set Temperature – Step 2

+/- Change value
↵ Accept value ➔ **2.2.9**
ESC restores the old value or **if in step 2 and higher** returns to ➔ **2.2.7** but the actual step will not be saved !

Note: Display 04/02 means actual program/step number

2.2.9 Set Vacuum – Step 2

Appears only with Option Vacuum Control !
+/- Change value
↵ Accept value ➔ **2.2.10**
ESC returns to ➔ **1**

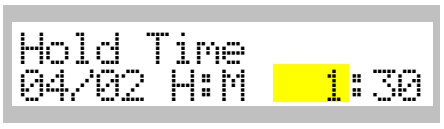
2.2.10 Set Hysteresis of vacuum – Step 2

Appears only with Option Vacuum Control !
+/- Change value
↵ Accept value ➔ **2.2.11**
ESC returns to ➔ **1**

2.2.11 Set Gradient – Step 2

+/- Change value
↵ Accept value ➔ **2.2.12**
ESC restores the old value or **if in step 2 and higher** returns to ➔ **2.2.7** but the actual step will not be saved !

2.2.12 Set Holding Time – Step 2



+/- Change value
↵ Accept value and skips to the next input field (HH ➔ MM) or stores the time and go to ➔ **2.2.13**
ESC restores the old value and skips back one input field (M➔H) or **if in step 2 and higher** returns to ➔ **2.2.7** but the actual step will not be saved !
Note: A value of 0:00 means endless holding time

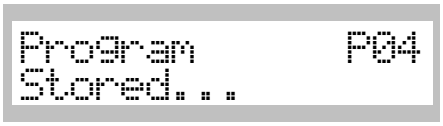
2.2.13 Choose if a additional step is required

+/- Change answer
↵ Accept answer
If **Yes** selected: step number will increment with 1➔ **2.2.7**
If **No** selected: ➔ **2.2.14**

2.2.14 End of programming sequence

+/- Change answer
↵ Accept answer
If **Yes** selected: ➔ **2.2.15**
If **No** selected: ➔ **2.2.13**

2.2.15 Confirming & Saving the new program



Displays confirmation that the new program has been stored.
After a few seconds the display will return to ➔ **2.2**

2.3 Menu Program- Edit

The example assumes to edit the program #4 with 2 steps

Edit an existing program
↵ Accept Menu ➔ **2.3.1**
▼/▲ scroll through the Menu.
ESC returns to ➔ **2**

2.3.1 Choose program to edit

+/- Change value
↵ Accept value and skips to the next field (P➔S) or ➔ **2.3.2** (to the selected Step Number respective)
ESC returns to ➔ **2.3**

Note: Only used program and step numbers will appear in the display

2.3.2 Set Temperature – Step 1

+/- Change value.
↵ Accept value ➔ **2.3.3**
ESC restores the old value or returns to ➔ **2.3** and the step 1 as well as selected program number is not stored !
Note: Display 04/01 means actual program/step number.

2.3.3 Set Vacuum – Step 1

Appears only with Option Vacuum Control !
+/- Change value
↵ Accept value ➔ **2.3.4**
ESC returns to ➔ **2.3**

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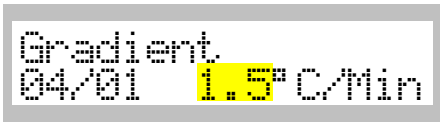
2.3.4 Set Hysteresis of vacuum – Step 1

Appears only with Option Vacuum Control !

+/- Change value
↵ Accept value ➔ **2.3.5**
ESC returns to ➔ **2.3**

2.3.5 Set Gradient – Step 1



+/- Change value
↵ Accept value ➔ **2.3.6**
ESC restores the old value or returns to ➔ **2.3** and the step 1 as well as selected program number is not stored !
Note: A value of 0:0 means maximal gradient

2.3.6 Set holding time (dwell time) – Step 1

+/- Change value
↵ Accept value and skips to the next input field (HH ➔ MM) or stores the time and go to ➔ **2.3.7**
ESC restores the old value and skips back one input field (M➔H) or goes back to ➔ **2.3** and the step 1 as well as selected program number is not stored !
Note: A value of 0:00 means endless holding time

2.3.7 Set Temperature – Step 2

+/- Change value
↵ Accept value ➔ **2.3.8**
ESC restores the old value or **if in step 2 and higher** returns to ➔ **2.3** but changes to the actual step will not be saved !

Note: Display 04/02 means actual program/step number

2.3.8 Set Vacuum – Step 2

Appears only with Option Vacuum Control !
+/- Change value
↵ Accept value ➔ **2.3.9**
ESC restores the old value or **if in step 2 and higher** returns to ➔ **2.3** but changes to the actual step will not be saved !

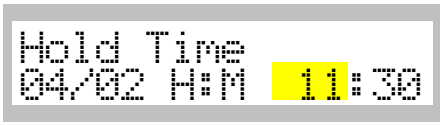
2.3.9 Set Hysteresis of vacuum – Step 2

Appears only with Option Vacuum Control !
+/- Change value
↵ Accept value ➔ **2.3.10**
ESC restores the old value or **if in step 2 and higher** returns to ➔ **2.3** but changes to the actual step will not be saved !

2.3.10 Set Gradient – Step 2

+/- Change value
↵ Accept value ➔ **2.3.11**
ESC restores the old value or **if in step 2 and higher** returns to ➔ **2.3** but changes to the actual step will not be saved !

2.3.11 Set Holding Time – Step 2



+/- Change value
↵ Accept value and skips to the next input field (HH ➔ MM) or stores the time and go to ➔ **2.3.12**
ESC restores the old value and skips back one input field (M➔H) or **if in step 2 and higher** returns to ➔ **2.3** but changes to the actual step will not be saved !
Note: A value of 0:00 means endless holding time

2.3.12 Choose if a additional step is required

+/- Change answer
↵ Accept answer
If **Yes** selected: step number will increment with 1➔ **2.3.7**
If **No** selected: ➔ **2.3.13**

2.3.13 End of programming sequence

+/- Change answer
↵ Accept answer
If **Yes** selected: ➔ **2.3.14**
If **No** selected: ➔ **2.3.12**

2.3.14 Confirming & Saving the new program

Displays confirmation that the new program has been stored.
After a few seconds the display will return to ➔ **2.3**

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2.4 Menu Program - Delete

Delete an existing program
↵ Accept Menu ➔ **2.4.1**
▼/▲ scroll through the menu.
ESC returns to ➔ **2.4**

2.4.1 Choose program # to be deleted

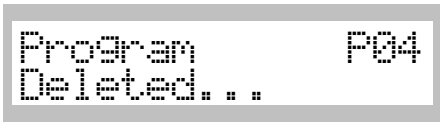
+/- Change value
↵ Accept value ➔ **2.3.2**
ESC returns to ➔ **2.4**

Note: Only used program numbers will appear in the display

2.4.2 Deletion confirmation will be displayed

+/- Change answer
↵ Accept answer
If **Yes** selected: ➔ **2.4.3**
If **No** selected: ➔ **2.4**

2.4.3 Deletion confirmation will be displayed



Display confirms that the selected program has been deleted. After a few seconds it will go to ➔ **2.4**

If you delete a program means you delete all steps associated to this program number. After deleting, the number is now available in the list of free program numbers.

2.5 Menu Program - Print

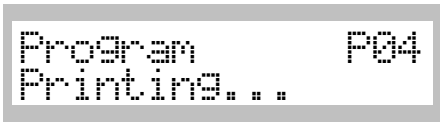
Print a program
↵ Accept Menu ➔ **2.5.1**
▼/▲ to scroll through the Menu.
ESC return to ➔ **2**

2.5.1 Choose program # to be printed

+/- Change value
↵ Accept value ➔ **2.5.2**
ESC return to ➔ **2**

Note: Only used program numbers will appear in the display

2.5.2 Displaying print in progress



Display confirms that the program has been printed. After a few seconds it will return to ➔ **2.5**

For an example of printout and printer connection refer section Printer Operation

3 Main Menu - Configuration

Configuration of the system by the user

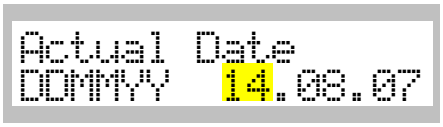
In this menu point you can define and set system options
↵ Accept Menu ➔ **3.1**
▼/▲ scroll through the menu.

3.1 Select language

+/- Change answer
↵ Accept answer ➔ **3.2**

Attention:
After confirmation the selection all subsequent dialogs are displayed in the selected language.

3.2 Set actual date for internal real-time clock



+/- Change value
↵ Accept value and skips to the next input field ((DD ➔ MM, MM➔YY) or saves the date and goes to ➔ **3.3**
ESC restores the old value and/or skips back one input-field (YY➔MM, MM➔ DD)

3.3 Set actual time for internal real-time clock

+/- Change value
↵ Accept value and skips to the next input field ((HH ➔ MM) or saves the time and goes to ➔ **3.4**
ESC restores the old value and/or skips back one input-field (MM➔HH)

3.4 Set allowed max Temperature

Set the maximal possible temperature value for manual operation.
+/- Change value
↵ Accept value➔ **3.5**
ESC restores value

3.5 Set Threshold value

Appears only with Option Vacuum Control !
Set the Threshold value between 1 – 1100 mbar
Heating will only start when this value has been reached.
For heating without this safety feature, enter a value of 1100.0 mbar
+/- Change value
↵ Accept value➔ **3.6**
ESC restores value

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3.6 Set waiting time for Threshold value

Appears only with Option Vacuum Control !

Set the waiting time for the Threshold value between 1 Min and 1Hour 59 Min. Should the Threshold value (3.5) not been reached within the programmed time, the process will not start and the message “no vacuum” appears in the display.

+/- Change value

↵ Accept value➔ **3.7 ESC** restores value

3.7 Set print interval for printer log via serial RS232 Interface

Set the Print Interval time. A value of 00:00 will disable printout of operating values.

+/- Change value

↵ Accept value and skips to the next input field ((HH ➔ MM) or saves the time and goes to ➔ **3.8**

ESC restores the old value and/or skips back one input-field (MM➔HH)

3.8 Set automatic interval to scroll status displays

Select if operation displays will switch automatically instead of manually switching by ▼/▲ keys

+/- Change answer

↵ Accept answer ➔ **3.9**

3.9 Select Baud Rate for serial RS232 Interface

Available Baud Rate are1200/2400/4800/9600.

+/- Change value

↵ Accept value ➔ **3.10**

3.10 Set Program End Buzzer

Buzzer sends a signal if a program has finished

+/- Change answer

↵ Accept answer ➔ **3.11**

3.11 Set Safety Alarm-Buzzer

In any case of an over temperature alarm situation, the Buzzer will give an audio signal.

+/- Change answer

↵ Accept answer ➔ **3.12**

3.12 Set LCD Display contrast

+/- Change value

↵ Accept value ➔ **3.13**

ESC restores value

3.13 Set Offset between internal PT100 Sensor and actual display

Offsets the internal PT100 sensor with the actual displayed temperature. Calibrate with an external temperature sensor.
+/- Change value
↵ Accept value ➔ **3.14**
ESC restores value

3.14 Set Offset between internal pressure sensor and actual display (Option)

Appears only with Option Vacuum Control !
Offsets the pressure sensor with the actual displayed vacuum. Calibrate with an external pressure sensor.
+/- Change value
↵ Accept value ➔ **3.15**
ESC restores value

3.15 Confirmation display of storing entered values

The Display confirms that the Configuration has been Stored.
After a few seconds it will return to ➔ **3**

4 Menu Service Mode

This menu point is protected by a code and is only available for trained Service-Technicians.

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Status Displays

General

Change the display with ▼/▲ keys or set Display Interval to yes in Menu Configuration to let change the display automatically.
The values shown here have only an example character.
The display will differ according the installed option

❶ Without Options	❷ Option: Vacuum Display only	❸ Option: Vacuum Controller

5 Status Display: Manual Mode – Defined Start-Date

If the programmed start-date/time has achieved the systems starts. The display switches to ➔ **6**

	❶	❷	❸	
Start Date 31.12.07 23:59	✓	✓	✓	Start Date and Time ▼ to next set of operating display
Set Temp 100.9°C Gradient 1.9°C/M	✓	✓	✓	Set Temperature and Gradient ▼ to next set of operating display
SVac 20.0mbar HVac 2.0mbar			✓	Set Vacuum and Hysteresis Vacuum ▼ to next set of operating display
Hold Time 10:59	✓	✓	✓	Hold Time (Dwell Time) ▼ to first set of operating display

6 Status Display: Manual Mode – Process Running

	❶	❷	❸	
Set Temp 100.0°C Act Temp 100.0°C	✓	✓	✓	Set Temperature and Actual Temperature Press ▼ to get next set of operating-display.
Gradient 1.9°C/M	✓			Gradient ▼ to next set of operating display
Gradient 1.0°C/M AVac 20.9mbar		✓		Gradient and Actual Vacuum ▼ to next set of operating display
Gradient 1.9°C/M HVac 2.0mbar			✓	Gradient and Hysteresis Vacuum ▼ to next set of operating display
SVac 20.0mbar Vac 20.2mbar			✓	Set Vacuum Actual Vacuum ▼ to next set of operating display
Hold Time 1:59 31.12.07 23:59	✓	✓	✓	Hold Time (Dwell Time) and Date/Time ▼ to first set of operating display

7 Status Display: Program mode - Defined Program Start Date

If the programmed Start Date/Time has achieved the system is running the selected program and the display switches to ➔ **8**

The indicator-LED „Prog“ is flashing as long as the defined start-date/time has not reached.

	❶	❷	❸	
Start Date P14 09.09.07 13:10	✓	✓	✓	Start Date and Program number **ESC** cancels the Start Date ➔ **9**

8 Status Display: Program mode - Program Running

The indicator-LED „Prog“ is on during a programmed operation

	❶	❷	❸	
Set Temp 100.9°C Act Temp 100.9°C	✓	✓	✓	Set Temperature and Actual Temperature. ▼ to next set of operating display.
Gradient 1.9°C/M	✓			Gradient ▼ to next set of operating display
Gradient 1.9°C/M AVac 20.0mbar		✓		Gradient and Actual Vacuum ▼ to next set of operating display
Gradient 1.9°C/M HVac 2.0mbar			✓	Gradient and Hysteresis Vacuum ▼ to next set of operating display
SVac 20.0mbar AVac 20.2mbar			✓	Set Vacuum and Actual Vacuum ▼ to next set of operating display
Hold Time 10:59 31.12.03 23:59	✓	✓	✓	Hold Time (Dwell Time) and Date/Time ▼ to next set of operating display
Program 04 Step 01	✓	✓	✓	Program Number and Program Step ▼ to first set of operating display

If the program has elapsed correctly a audio signal (5x) will sound and the display is showing:

Message: Program finished	↵ Accept message

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9 Cancel a running process by ESC Key

A running system is stopped by pressing ESC.

9.1 Safety question when stopping a running system

+/- Change answer
↵ Accept answer
If **Yes** selected: ➔ **9.2**
If **No** selected: ➔ **Back to running status**

9.2 Conformation of cancelling a process

Display confirms that the running process has been cancelled.
After a few seconds display will return to Main Menu ➔ **1**

10 Messages and Errors

The messages and Errors are announced with a Buzzer (5x) and can be confirmed by pressing ↵

Messages

Indicates that no program is in memory
↵ Accept message

Indicates that the program memory is full
↵ Accept message

Indicates that the door is open (manual process or starting a program)
↵ Accept message

Indicates that the Threshold value for vacuum has not reached within the programmed waiting time
↵ Accept message

Errors

PT100 Sensor or cable defect
↵ Accept message
Call Service!

Temperature exceeded security range level
↵ Accept message
Cool down oven
If error persist call Service!

↵ Accept message
Call Service!

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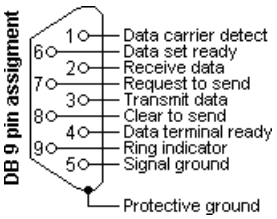
Printer Operation

Connecting a Printer

Printer Requirements

In order to connect a printer with the serial RS232 Interface of the System following requirements must be fulfilled : Serial RS232 Interface, Min. 1200 Baud Transfer Rate.

Pin Layout RS232 DB9 Connector System



Used Pins: 2:TxD , 3:RxD and 5:Signal Ground
Data format: 8 Data Bits, 1 Stop Bit, No Parity
No specific protocol

Examples of different printer outputs

1 Without Options	2 Option: Vacuum Display only	3 Option: Vacuum Controller

Printout of a stored program

To print the content of stored programs go to Menu "Print Program" ➔ 2.5)
The printout depends on the installed vacuum options.

Printout of a program in memory		1	2	3
Program Nr:	1	✓	✓	✓
Step::	1	✓	✓	✓
Set Temperature:	20.0°C	✓	✓	✓
Gradient:	0.2°C/Min	✓	✓	✓
Set Vacuum:	5.5mbar			✓
Hysteresis Vacuum:	2.5mbar			✓
Hold time:	1:00HHH:MM	✓	✓	✓

Printouts during a run

In order to get printer output for logging active you must set the print interval (see "Print Interval" ➔ 3.5) to a value greater than 0:00, otherwise it is disabled.

Manual Operation		1	2	3
Date:	25.09.02	✓	✓	✓
Time:	07:29	✓	✓	✓
Set Temperature:	20.0°C	✓	✓	✓
Act Temperature:	20.4°C	✓	✓	✓
Gradient:	0.2°C/Min	✓	✓	✓
Set Vacuum:	5.5mbar			✓
Act Vacuum:	5.4mbar		✓	✓
Hysteresis Vacuum:	2.5mbar			✓
Hold time:	1:00HH:MM	✓	✓	✓

Programmed Operation		1	2	3
Date:	25.09.02	✓	✓	✓
Time:	07:29	✓	✓	✓
Program:	48	✓	✓	✓
Step:	2	✓	✓	✓
Set Temperature:	20.0°C	✓	✓	✓
Act Temperature:	20.4°C	✓	✓	✓
Gradient:	0.2°C/Min	✓	✓	✓
Set Vacuum:	5.5mbar			✓
Act Vacuum:	5.4 mbar		✓	✓
Hysteresis Vacuum:	2.5mbar			✓
Hold time:	1:00HH:MM	✓	✓	✓

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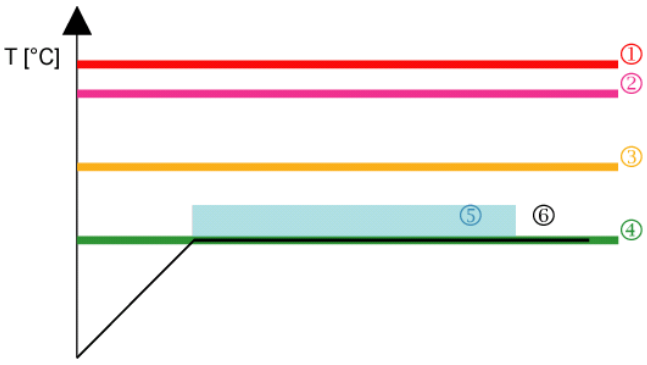
Appendix A

Hysteresis Value for the Vacuum-Control

The Hysteresis value of vacuum allows to influence the behaviour of the vacuum controlling.
The process of drying under vacuum is influenced by the vapour pressure of the fluids in the drying good. The higher the vapour pressure the lower the vacuum.
In extreme case the vacuum pump will run or the vacuum valve is open all the time because of reducing vacuum by the vapour. This behaviour can be controlled by system but the pump or the valve is all the time switching on and off.
To reduce this effect you can set a hysteresis value depending on the set vacuum value. This allows the controller a range of acting (hysteresis).
This gives a more precise and well controlled drying process

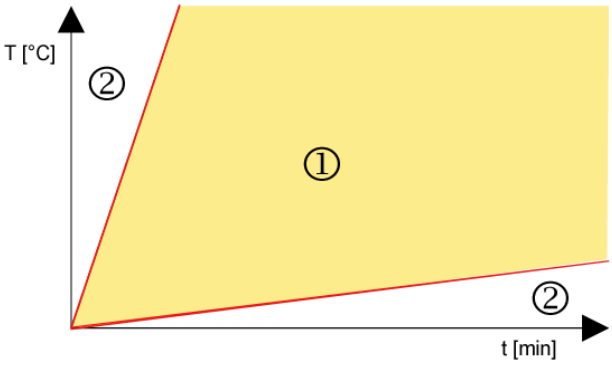
Graphs of temperature limits and gradient and Program-Run

Temperature Limiter & Safety Controlling (Safety Bond)



1. Over-Temperature Limiter by thermo-mechanical switch
2. Maximal allowed End Temperature
3. Maximal allowed working temperature (Menu Configuration)
4. Set Temperature
5. Control Range of the Safety Controller
6. Actual Temperature

Range of gradient



1. The gradient can be set in this range
2. This range can not be used. It is system depending

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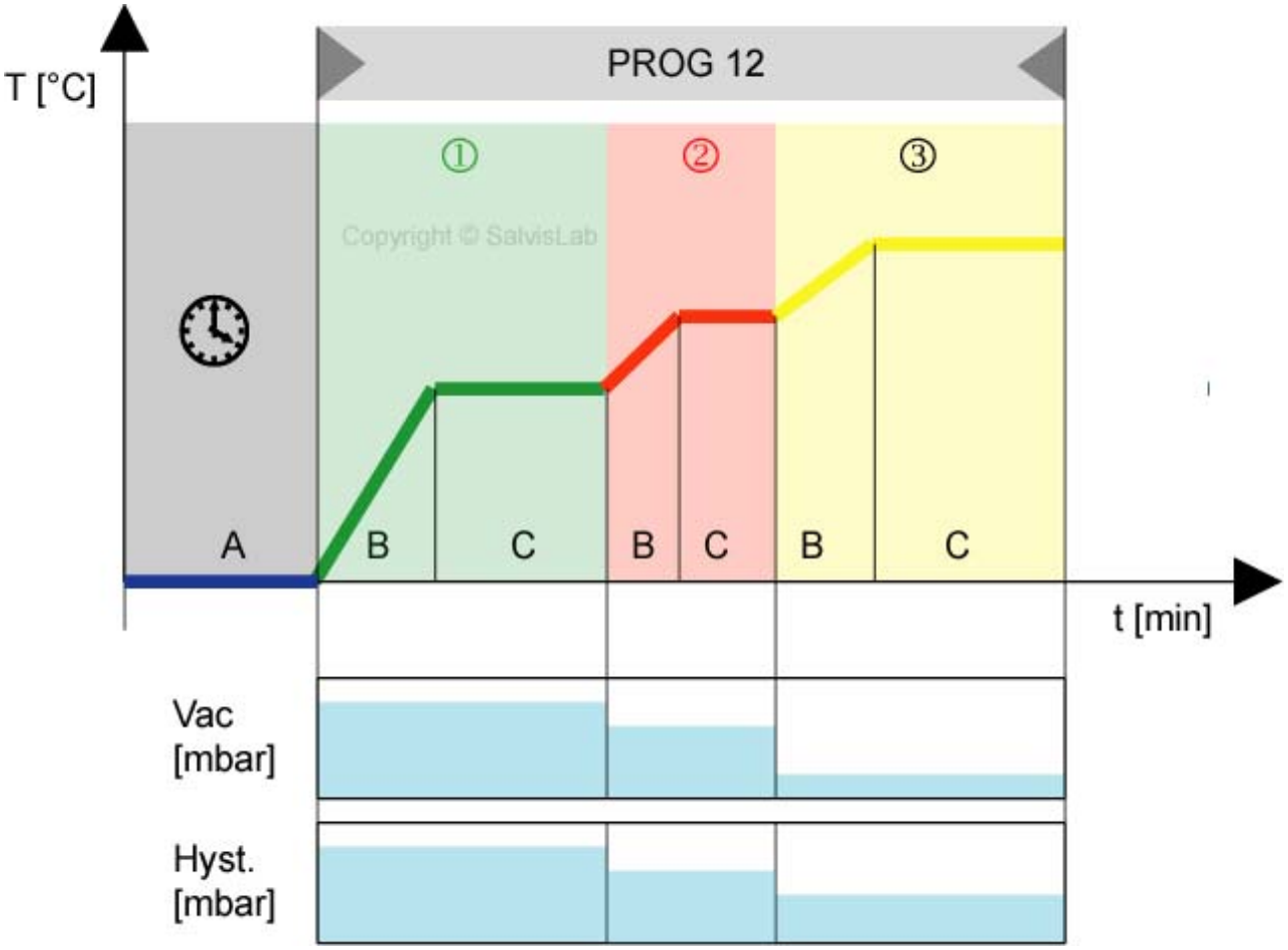
Graphical presentation of a program-run



This example shows a program No. 12 with 3 steps and a pre-setted start date/time.

A Timeframe of the pre-setted start date/time
B Positive Gradient (adjustable)
C Hold-Time, Dwell-Time (Adjustable)

Each of the following 3 steps has the parameter: Set-temperature, gradient, hold-time, set-vacuum, hysteresis vacuum

1 Step 1 : Start of program
2 Step 2 : New parameter setting where used.
3 Step 3 : New parameter setting where used. After finishing the step 3, the program ends.

Appendix B

Menu Structure & Input Fields

❋ = Menu Point ⊡ = Input Field ◇ = Decision Input ⊙ = Display only

	Pt		To pt
❋	1	**Main Menu** **Temp & Options**	
⊡	1.1	Set Temperature	1.2
⊡	1.2	Set Vacuum	1.3
⊡	1.3	Hysteresis Vacuum	1.4
◇	1.4	Start? Now Options	 6 1.5
⊡	1.5	Gradient	1.6
⊡	1.6	Hold Time	1.7
⊡	1.7	Start Date	1.8
⊡	1.8	Start Time	5 or 6

	Pt		To pt
❋	2	**Main Menu** **Program**	
❋	2.1	**Program Start**	2.2.1
⊡	2.1.1	Select Program	2.1.2
◇	2.1.2	Start Program? Now Later	 6 2.1.3
⊡	2.1.3	Start Date	2.1.4
⊡	2.1.4	Start Time	8
❋	2.2	**Program New**	2.2.1
⊡	2.2.1	Select Program/Step	2.2.2
⊡	2.2.2	Set Temperature	2.2.3
⊡	2.2.3	Set Vacuum	2.2.4
⊡	2.2.4	Hysteresis Vacuum	2.2.5
⊡	2.2.5	Gradient	2.2.6
⊡	2.2.6	Holding Time	2.2.7
◇	2.2.7	New Step? Yes No	 2.2.2 2.2
◇	2.2.8	End of Program Yes No	2.2 2.2.9
⊙	2.2.9	Program stored..	2.2
❋	2.3	**Program Edit**	2.3.1
⊡	2.3.1	Program Nr / Step	2.3.2
⊡	2.3.2	Set Temperature	2.3.3
⊡	2.3.3	Set Vacuum	2.3.4
⊡	2.3.4	Hysteresis Vacuum	2.3.5
⊡	2.3.5	Gradient	2.3.6
⊡	2.3.6	Hold Time	2.3.7
◇	2.3.7	New Step? No Yes	 2.3.8 2.3.1
◇	2.3.8	End of Program No Yes	 2.3.6 2.3.9
⊙	2.3.9	Program stored..	2.3
❋	2.4	**Program Delete**	2.4.1
⊡	2.4.1	Select Program	2.4.2
◇	2.4.2	Delete Program Yes No	 2.4.3 2.4.1
⊙		Program Deleted	2.4
❋	2.5	**Program Print**	2.5.1
⊡	2.5.1	Select Program	2.5.2
⊙	2.5.2	Printing Program	2.5

	Pt		To pt
❋	3	**Main Menu** **Configuration**	
⊡	3.1	Language	3.2
⊡	3.2	Date	3.3
⊡	3.3	Time	3.4
⊡	3.4	Max. Temp	3.5
⊡	3.5	Print Interval	3.6
⊡	3.6	Disp Interval	3.7
⊡	3.7	Rs232 Baud Rate	3.8
⊡	3.8	Buzzer Prog End	3.9
⊡	3.9	Buzzer Safety	3.10
⊡	3.10	Display Contrast	3.11
⊡	3.11	Sensor Offset	3.12
⊡	3.12	Vacuum Offset	3.13
⊙	3.13	Configuration stored	3

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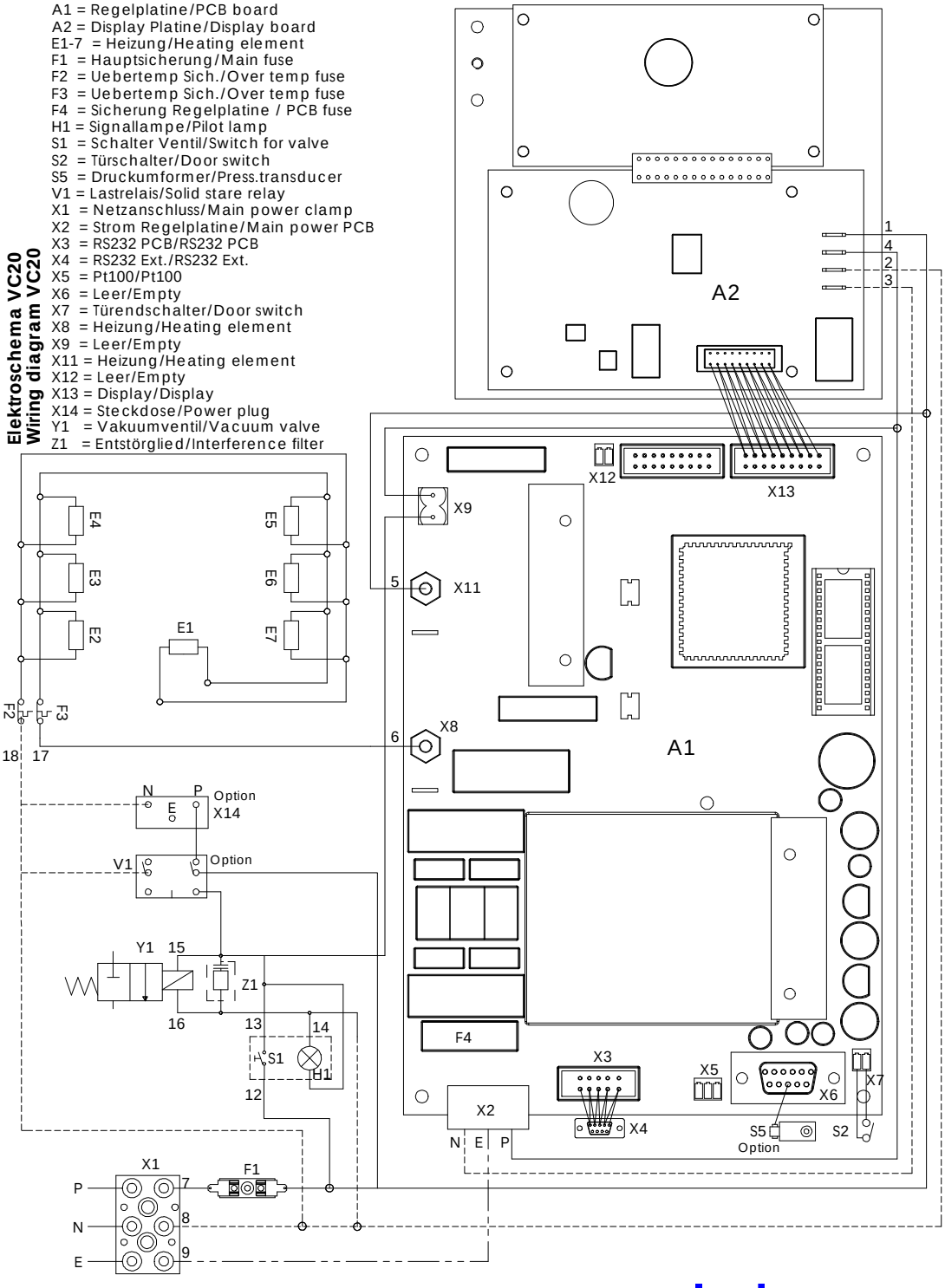
Appendix C

Wiring diagram VC 20

Elektroschema VC20
Wiring diagram VC20

A1 = Regelplatine/PCB board
A2 = Display Platine/Display board
E1-7 = Heizung/Heating element
F1 = Hauptsicherung/Main fuse
F2 = Uebertemp Sich./Over temp fuse
F3 = Uebertemp Sich./Over temp fuse
F4 = Sicherung Regelplatine / PCB fuse
H1 = Signallampe/Pilot lamp
S1 = Schalter Ventil/Switch for valve
S2 = Türschalter/Door switch
S5 = Druckumformer/Press.transducer
V1 = Lastrelais/Solid stare relay
X1 = Netzanschluss/Main power clamp
X2 = Strom Regelplatine/Main power PCB
X3 = RS232 PCB/RS232 PCB
X4 = RS232 Ext./RS232 Ext.
X5 = Pt100/Pt100
X6 = Leer/Empty
X7 = Türendschalter/Door switch
X8 = Heizung/Heating element
X9 = Leer/Empty
X11 = Heizung/Heating element
X12 = Leer/Empty
X13 = Display/Display
X14 = Steckdose/Power plug
Y1 = Vakuumventil/Vacuum valve
Z1 = Entstörglied/Interference filter



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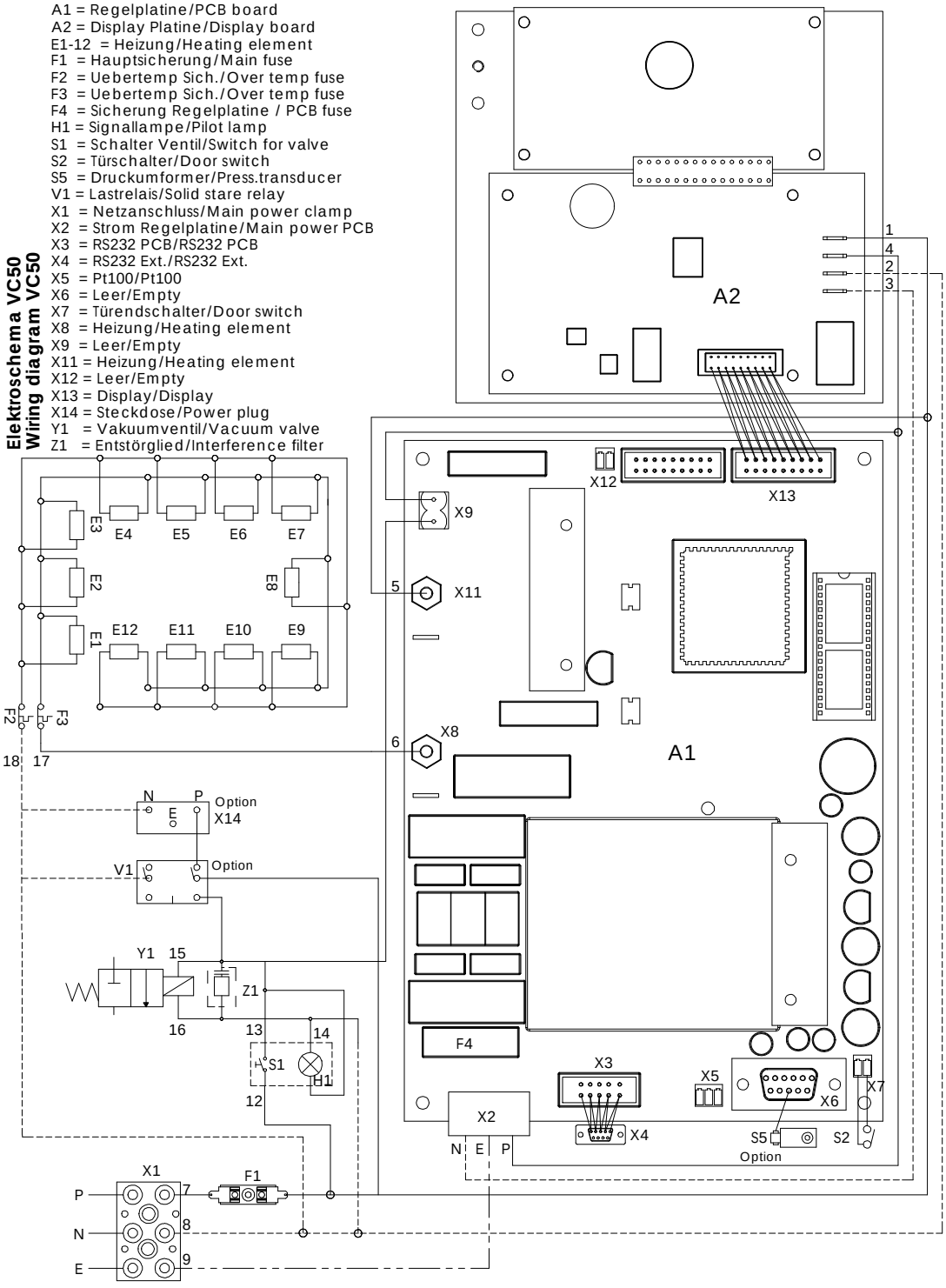
Appendix D

Wiring diagram VC 50

Elektroschema VC50
Wiring diagram VC50

A1 = Regelplatine/PCB board
A2 = Display Platine/Display board
E1-12 = Heizung/Heating element
F1 = Hauptsicherung/Main fuse
F2 = Uebertemp Sich./Over temp fuse
F3 = Uebertemp Sich./Over temp fuse
F4 = Sicherung Regelplatine / PCB fuse
H1 = Signallampe/Pilot lamp
S1 = Schalter Ventil/Switch for valve
S2 = Türschalter/Door switch
S5 = Druckumformer/Press.transducer
V1 = Lastrelais/Solid stare relay
X1 = Netzanschluss/Main power clamp
X2 = Strom Regelplatine/Main power PCB
X3 = RS232 PCB/RS232 PCB
X4 = RS232 Ext./RS232 Ext.
X5 = Pt100/Pt100
X6 = Leer/Empty
X7 = Türendschalter/Door switch
X8 = Heizung/Heating element
X9 = Leer/Empty
X11 = Heizung/Heating element
X12 = Leer/Empty
X13 = Display/Display
X14 = Steckdose/Power plug
Y1 = Vakuumventil/Vacuum valve
Z1 = Entstörglied/Interference filter



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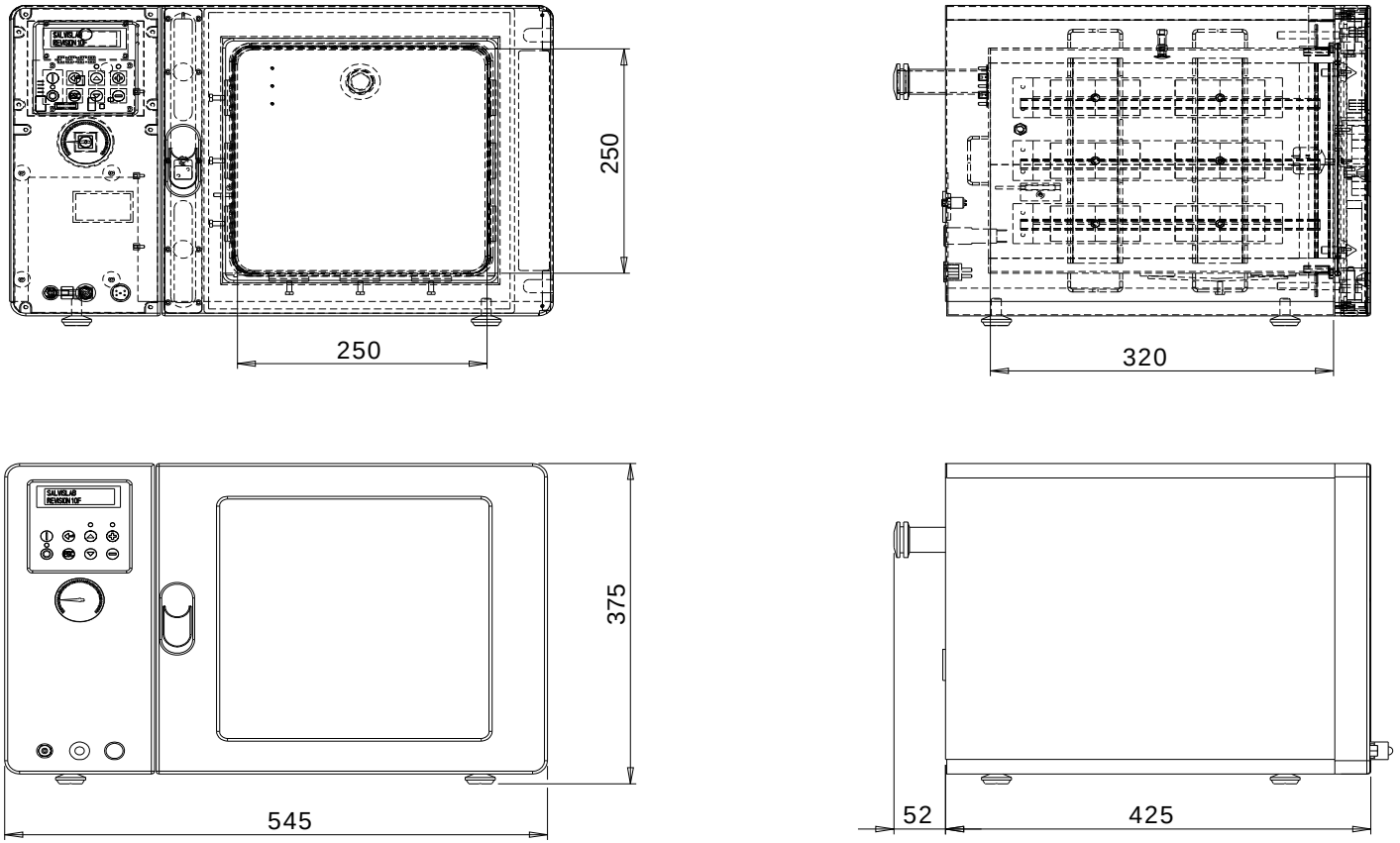
Appendix E

Drawing VC 20



Vacuum Oven VC 20

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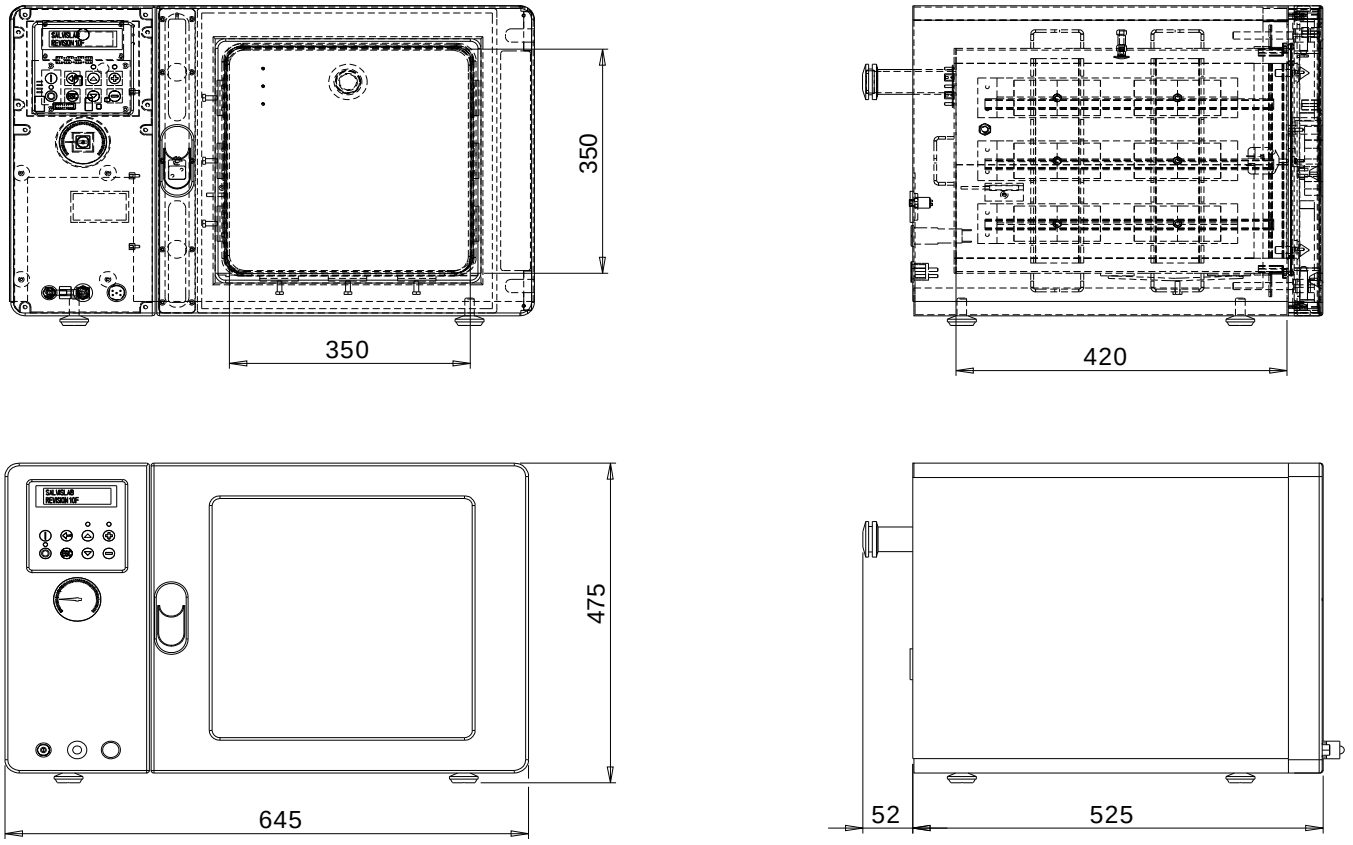
Appendix F

Drawing VC 50



Vacuum Oven VC 50

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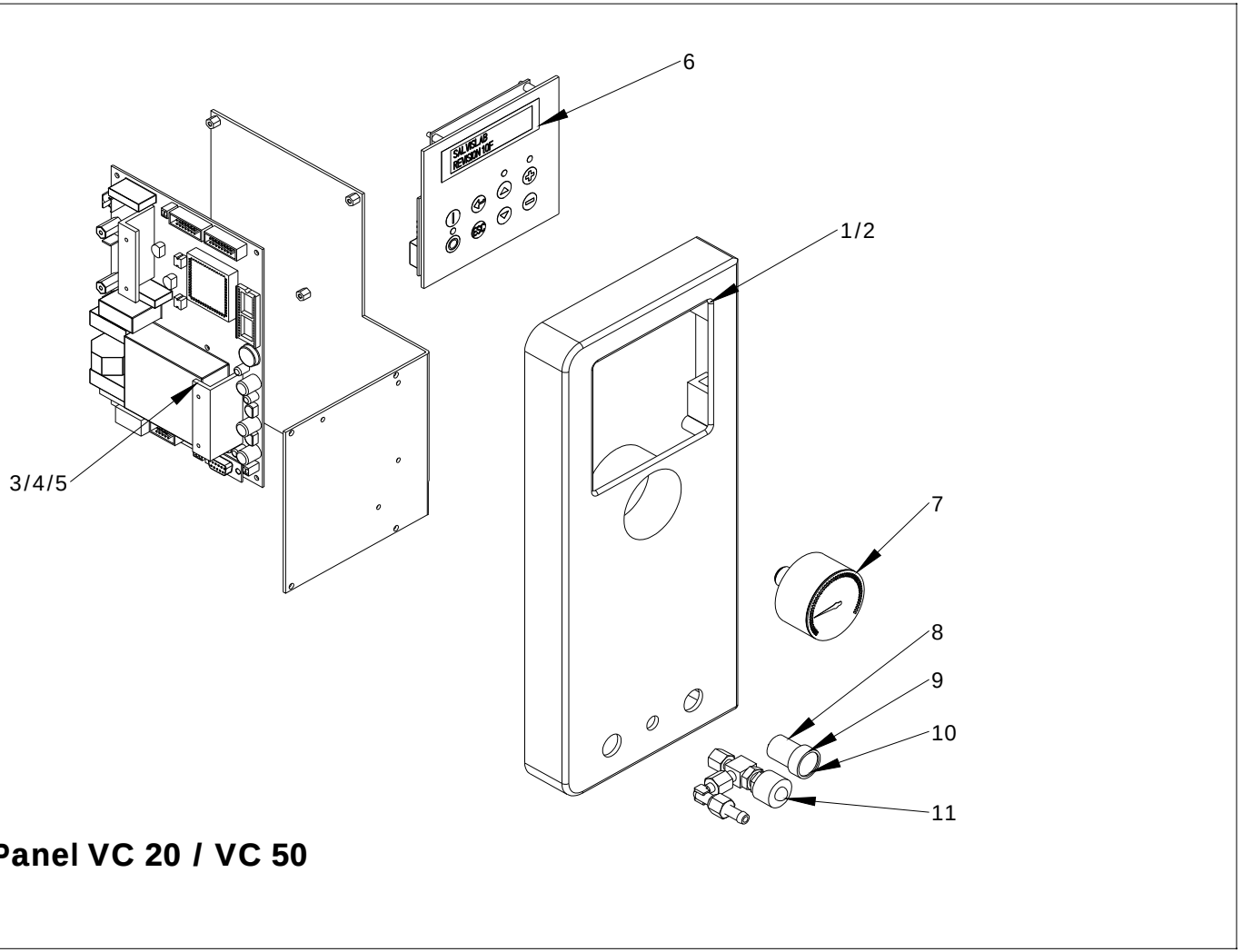
Appendix G

Drawing Spare Parts Panel



Panel VC 20 / VC 50

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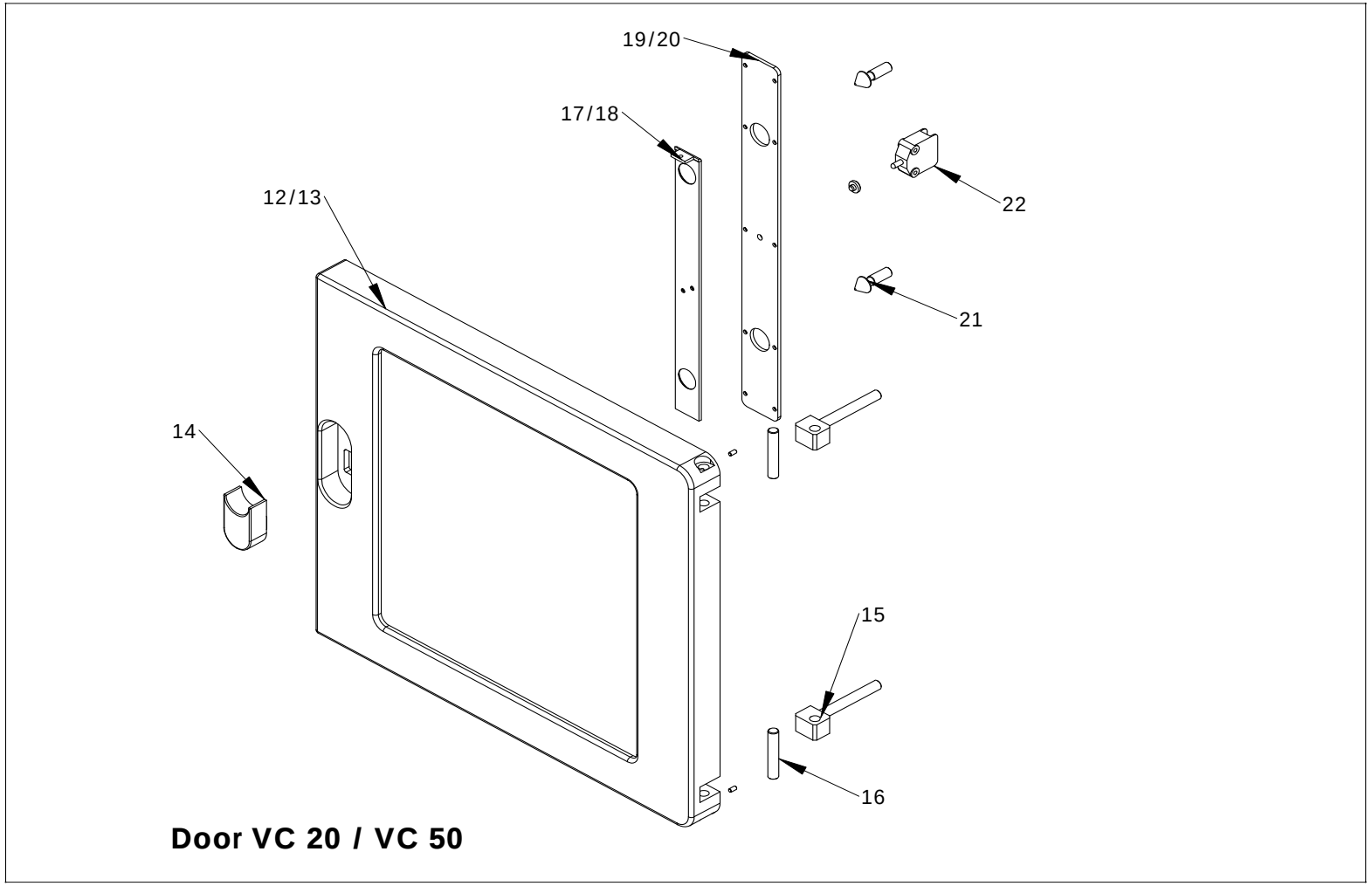
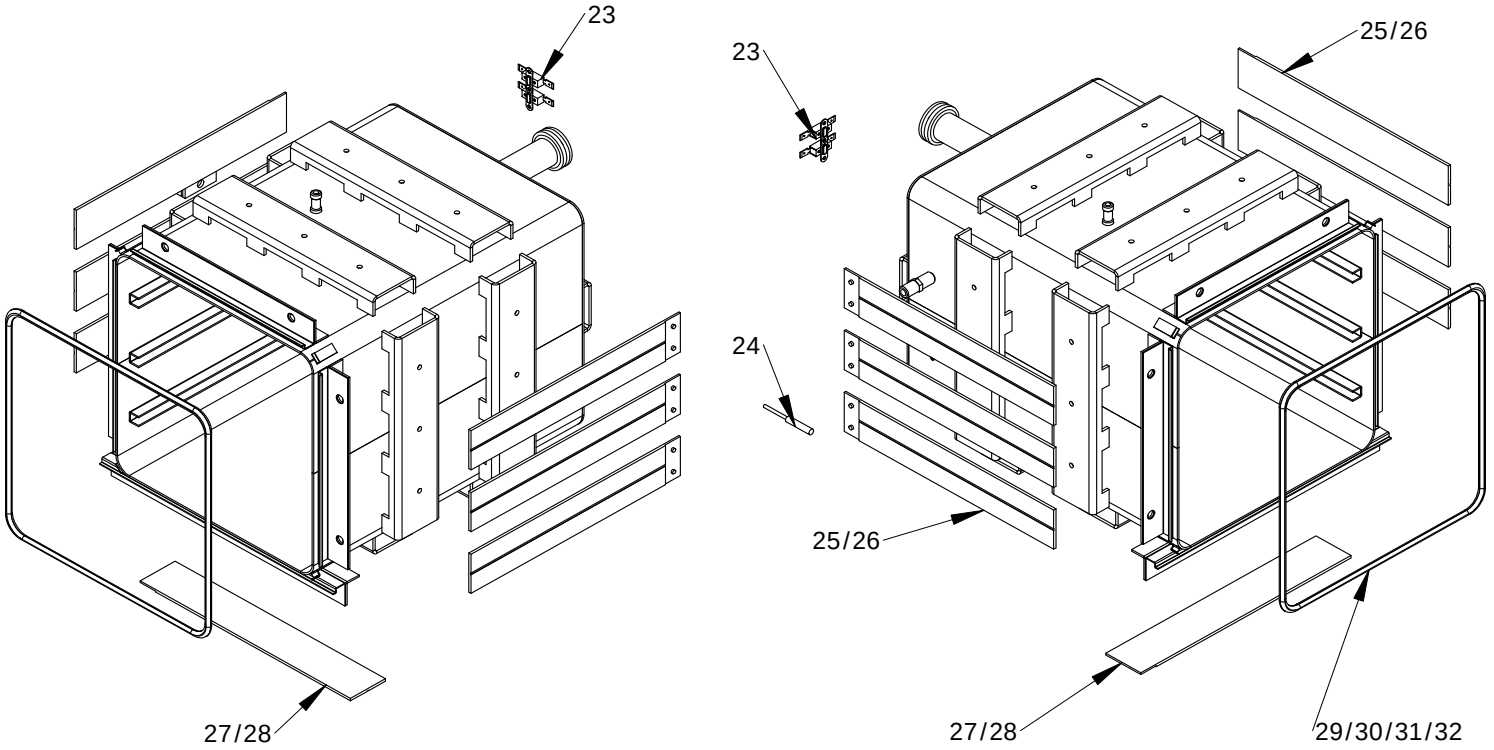
Appendix H

Drawing Spare Parts Door



Door VC 20 / VC 50

Drawing Spare Parts Chamber



Inner Chamber VC 20/50

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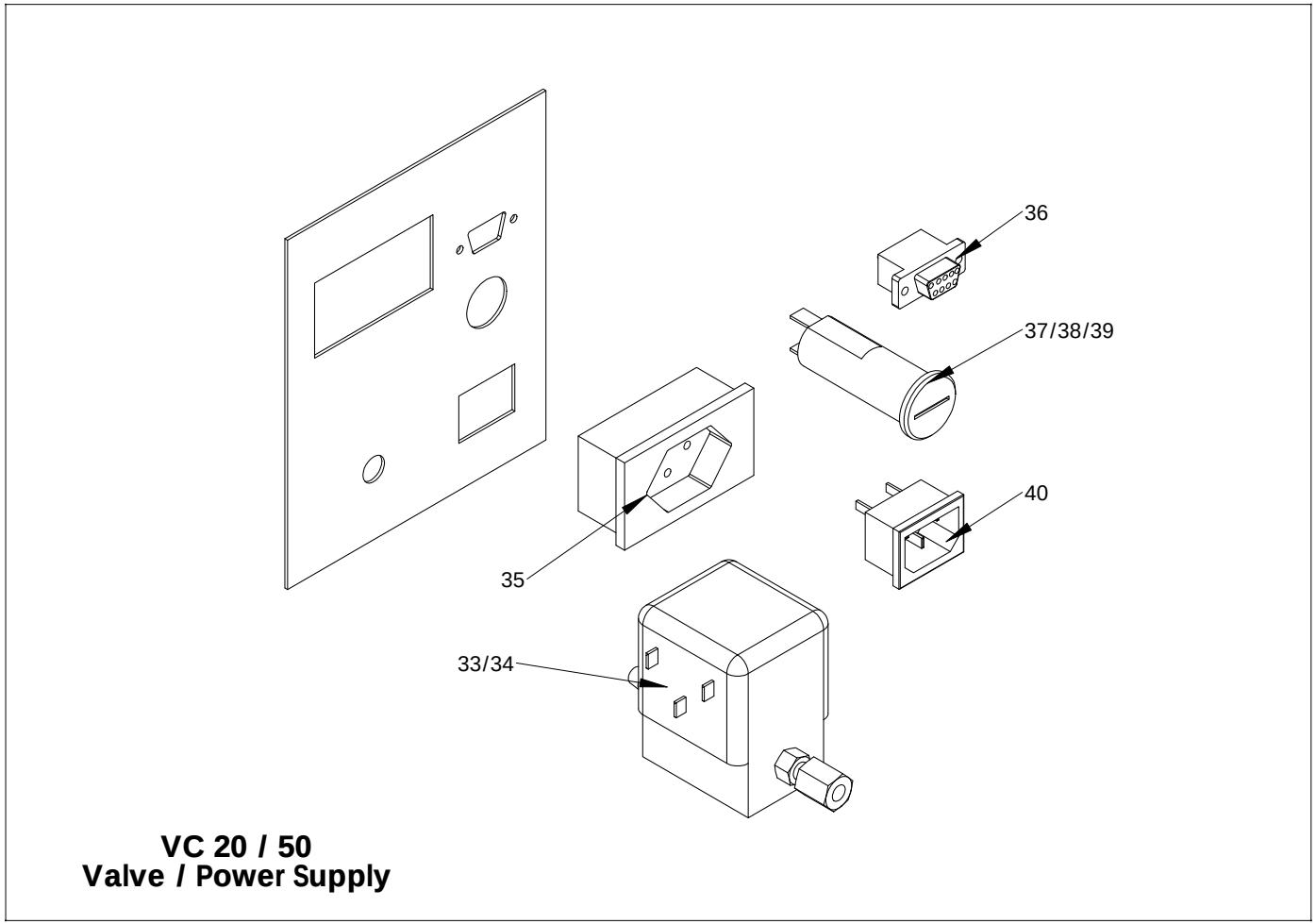
Appendix J

Drawing Spare Parts Valve / Power Supply



VC 20 / 50
Valve / Power Supply

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Appendix K

Spare Part Numbers

Position	Part Number	Description
1	31W04172015	Panel for VC-50
2	31W04172014	Panel for VC-20
3	31W04144150	Main PCB VC-20/50 230V/10A
4	31W04144151	Main PCB VC-20 115V/10A
5	31W04144149	Main PCB VC-50 115V/20A
6	31W04144152	Touch Panel 115V/230V
7	31W04942315	Gauge
8	31W04960707	Vacuum switch
9	31W04960708	Lid (green) for vacuum switch
10	31W04962007	Bulb for vacuum switch
11	31W04942309	Inlet valve for air / Inert gas
12	31W04141035	Door complete VC 20
13	31W04171012	Door complete VC 50
14	31W04174019	Door handle VC 20 / 50
15	31W04174095	Hinge bolt VC 20 / 50
16	31W04174200	Pin to hinge
17	31W04173010	Locking plate VC 20
18	31W04173011	Locking plate VC 50
19	31W04173009	Cover plate VC 20
20	31W04172002	Cover plate VC 50
21	31W04174096	Locking pin
22	31W04960700	Door switch
23	31W04962507	Over temperature fuse
24	31W04144123	Temperature sensor PT100
25	31W04870018	Flat heating element 230V / 110 Watt for VC-20/50
26	31W04962923	Flat heating element 115V / 110 Watt for VC-20/50
27	31W04870019	Flat heating element 230V / 133 Watt for VC-50
28	31W04962924	Flat heating element 115V / 133 Watt for VC-50

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Spare Part Numbers

Position	Part Number	Description
29	31W04943208	Door seal white VC 20 (starting with SN 317061)
30	31W04943209	Door seal white VC 50 (starting with SN 317061)
31	31W04174090	Door seal black VC 20 (until SN 317060)
32	31W04174091	Door seal black VC 50 (until SN 317060)
33	31W04848069	Single solenoid valve 230V/50Hz
34	31W04942340	Single solenoid valve 115V/60Hz
35	31W04884001	Power Plug for Vacuum Pump (only Option 31F04302)
36	31W04144146	D-Sub 9 Connector
37	31W04881007	Fuse Holder
38	31W04881008	Closing Cap to Fuse Holder
39	31W04881010	Fuse 10 A
40	31W04961469	Appliance Couper